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EFFECT OF IBA FOR INDUCING ROOTING IN STEM CUTTINGS OF *DURANTA GOLDEN*

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ABSTRACT : The present investigation was conducted in the mist house located at the HNB Garhwal University, Srinagar, Garhwal, Uttarakhand, India. Softwood cuttings of *Duranta erecta ver. golden* were collected from 2 to 4 year old plants and 15 cm long cuttings with apical portion. The cuttings were treated with 1, 2, 3, 4 and 5g.L^{-1} IBA solutions by quick dip method. Among all the treatments, highest number of roots per cutting (43.00), length of roots per cutting (9.28 cm), diameter of root per cutting (1.67 mm), percentage of rooted cutting (88.00 %), number of sprouts per cuttings (4.34) and the minimum (20.66) days taken to callus formation was noticed in 4g L^{-1}IBA concentration.

Keywords : *Duranta golden, softwood cutting, IBA, rooting, quick dip.*

Duranta erecta (Golden Dewdrop) is a shrub of the Verbenaceae family, commonly cultivated as an ornamental plant in tropical and semi-tropical gardens. Originally native to Central and South America and the Caribbean, it is widely naturalized throughout the tropics and has become an invasive species in Australia, China, South Africa and on several Pacific Islands.

It can grow to 18 feet (5.5 m) tall and can spread to an equal width. Mature specimens possess axillary thorns, which are often absent on younger specimens. Leaves are light green, elliptic to ovate, opposite, and grow up to 3 inches (8 cm) long. Showy light-blue or lavender flowers are in tight clusters located on terminal and axillary stems, blooming almost all the year. The fruits are small yellow berries, approximately one half inch (1 cm) in diameter. Duranta can be used in a number of ways. If left to its own devices, the bush forms a sprawling, carefree hedge. Its colourful features also make it an attractive focal point in the landscape. There are a wide variety of cultivars available, including 'Alba', 'Aurea', 'Aussie Gold', 'Gold Mound', 'Geisha Girl', 'Sapphire Showers', and 'Variegata' (Culbert, 4).

MATERIALS AND METHODS

The investigation was conducted at the Horticultural Research Centre of HNB Garhwal University, Srinagar (Garhwal), Uttarakhand, India. The average temperature and relative humidity inside the mist house during experiment was 35 ± 3 °C and 80 ± 5%, respectively. The soil temperature measured was around 26 ± 2 °C. The experimental materials, consisted of 15 cm long softwood stem cuttings of *D. erecta var. golden,* were collected from 3 year old plants. Vermicompost was used as the rooting media. There were six treatments of growth regulator formulations used at different concentrations; ten cuttings were used for each treatment which was replicated thrice. The prepared cuttings were planted in pots after dipping in solutions of IBA at 1g L^{-1}, 2g L^{-1}, 3g L^{-1}, 4g L^{-1} and 5g L^{-1}. The basal 1.5-2.0 cm portion of the cuttings was dipped in growth regulator solution for 10 seconds and immediately planted in medium to a depth of 6-8 cm. The cuttings (nine numbers per treatment) were carefully removed from the pots and dipped in water to remove the soil particles adhering to roots to record the observations pertaining to roots viz., days taken for callus formation, number of roots/cutting, length of roots/cutting, diameter of roots/cutting and percentage of cuttings rooted, number of sprouts, length and diameter of sprout (cm), fresh and dry weight of roots (g). The data recorded were subjected to statistical analysis for least significant difference (RBD) as described by Snedecor and Cochran (13).

RESULTS AND DISCUSSION

A perusal of Table 1 and Fig. 1 shows that the effect of different concentrations of IBA significantly affected the various growth characters of leafy cuttings in *Duranta golden*.

Among IBA concentrations, 4g L^{-1} concentration showed the highest percentage of rooted cutting

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Table 1: Effect of IBA concentration on rooting of *Duranta* golden.

Treatments	Rooting %	Callus	Number of roots	Diameter of root (mm)	Length of roots (cm)
IBA 1g.L^{-1}	45.15	52.07	18.04	1.00	5.78
IBA 2g.L^{-1}	51.23	48.30	26.33	1.00	7.02
IBA 3g.L^{-1}	63.26	32.11	27.44	1.00	6.50
IBA 4g.L^{-1}	88.00	20.66	43.00	1.66	9.28
IBA 5g.L^{-1}	80.34	25.00	40.00	1.33	8.66
Control	7.20	70.00	3.66	1.00	3.72
CD (P=0.05)	6.76	5.61	1.10	0.16	1.03

Table 2: Effect of IBA concentration on survival performance of *Duranta* golden.

Treatment	Number of sprouts	Length of sprout (cm)	Diameter of sprout (mm)	Fresh weight of root (g)	Dry weight of root (g)
IBA 1gL^{-1}	5.78	5.92	1.26	0.27	0.15
IBA 2gL^{-1}	7.02	7.59	1.41	0.18	0.10
IBA 3gL^{-1}	6.50	5.68	1.03	0.15	0.05
IBA 4gL^{-1}	9.28	7.55	1.41	0.27	0.11
IBA 5gL^{-1}	8.66	9.34	2.15	0.39	0.13
Control	3.72	4.13	0.72	0.22	0.08

(88.00%) followed by 5g L-1 concentration of IBA. The minimum percentage of rooted cuttings (7.16 %) was recorded under control. The enhanced hydrolytic activity in presence of applied IBA coupled with appropriate planting time might be responsible for the increased percentage of rooted cuttings. High carbohydrate and low nitrogen have been reported to favour root formation (Carlson, 3). These findings are agreed with the finding of Gupta (5) in *Buddlea asiatica.* The maximum average length of roots per cutting (9.28 cm) was recorded under 4gL^{-1} concentration of IBA followed by 5gL^{-1} concentration of IBA, while the minimum average length of roots per cutting (3.72 cm) was recorded under control treatments. Auxin application has been found to enhance the histological features like formation of callus and tissue and differentiation of vascular tissue (Mitra and Bose, 8). These findings are agreed with the finding of Singh *et al.* (11) in long pepper. The maximum average diameter of thickest root (1.66 cm) was recorded under 4g L^{-1} concentration of IBA followed by 5g L^{-1} concentration and the minimum average diameter of thickest root (1.00 cm) was recorded under control. The minimum days (20.66 days) taken to callus formation in softwood cuttings of *D. erecta* was noticed under IBA concentration at 4gL^{-1} and maximum (70.00 days) was found with control set of cuttings after insertion in to the rooting medium. The present findings are similar to the findings of Singh *et al.* (12) with respect to minimum days taken to callus formation in *Thuja.* The highest number of roots per cutting (43.00) was recorded under 4g L^{-1} concentration of IBA followed by 5g L^{-1} concentration while the minimum number of roots per cutting (3.66) was recorded under control treatment (Table 1). The better number of root per cutting with optimum time and IBA treatments might be ascribed due to better root growth which augmented absorption and translocation of nutrients from soil which take active part in various plant metabolic processes (Singh, 10). These findings agree with the reports of Alam *et al.* (2) with respect to number of roots per cutting. In addition to growth regulators the better rooting can be attributed to the favourable conditions like high temperature (30-35°C) and high relative humidity (85-90%) through intermittent misting and is responsible for reduced transpiration and respiration rate associated with higher photosynthetic activity which promoted better rooting in cuttings (Hartmann and Kester, 6).

Among IBA concentrations, 4gL^{-1} of IBA showed the maximum number of sprouts per cutting (9.28) followed by 5gL^{-1} concentration. The minimum number of sprouts per cutting (3.72) was recorded under control set. According to Thimmappa and Bhattacharjee (14), auxins naturally occurring or exogenously applied are required for initiation of

Figure 1: Root formation in *Duranta erecta var. golden* with various concentrations of IBA treatments.

adventitious roots on stems. It appears probable that the success of IBA is due to its low auxin activity and its slow degradation by auxin destroying enzyme. These findings are agreed with the finding of Ahmad *et al.* (1) with respect to number of sprouts per cutting. The maximum average diameter of sprout per cutting (2.15 mm) was observed under $5gL^{-1}$concentration of IBA followed by $2gL^{-1}$ and $4gL^{-1}$. The findings of Mahros (7) also reported similar results in respect to diameter of sprout per cutting. The highest average length of sprout per cutting (9.34 cm) was recorded under $5gL^{-1}$ concentration of IBA followed by $2gL^{-1}$ concentration. Application of IBA at right time proved beneficial effect on the cutting of *Bougainvillea peruviana* (Singh, 10). The highest average fresh weight of root per cutting (0.39g) was recorded under $5gL^{-1}$ concentration of IBA, followed by $4gL^{-1}$ concentration of IBA. The maximum average dry weight of roots per cutting (0.15 g) was recorded under $1gL^{-1}$ concentration of IBA followed by $5gL^{-1}$ concentration (Table 2). These finding are agreed with the finding of Pratima and Rana (9) in kiwifruit.

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